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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/388,567	09/02/1999	HOWARD E. RHODES	303.593US1	4170

7580 10/01/2003
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EXAMINER

MITCHELL, JAMES M

ART UNIT

PAPER NUMBER

2827

DATE MAILED: 10/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/388,567	RHODES, HOWARD E.	
	Examiner	Art Unit	
	James M. Mitchell	2827	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-17 and 22-60 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-17 and 22-60 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s) _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____. | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 3-8, 11, 15-17, 23-30 and 48-54 are rejected under 35 U.S.C. 102(b) as being anticipated by Huang et al. (US 6,069,066).

3. Huang (Fig 2A-F) discloses a conductive structure and interconnect comprising a trench having a depth and width, the depth being greater than a critical depth (via sum of bottom layers), a number of metal layers (208,210, 212; Fig 2C) above the trench (206); wherein at least one of the number of metal layers is fabricated from copper (Col. 2, Lines 39-41) having a thickness; wherein said width is greater than the critical width (via more than twice the sum of sidewalls, 208, 210); and each number of metal stacked layers is planarized by CMP (Col. 2, Lines 56-59); alternatively a narrow first trench (205) having a top and depth greater than a critical depth (via sum of thickness of 208) and a width less than a sidewall width of a first metal (210), and a wide second trench or depression (206) having a depth greater than a second critical depth and a width greater than twice the side wall width of the first metal (210) and less than twice a sidewall width of an Al second metal (212; Col. 2, Lines 50-55)) with the first and

second metal deposited on the first and the second trench and the second trench is planarized to the top of the first trench; said second trench with a second width greater than the width (assumed to be critical width) with one of the plurality of metal layers coupled to the metal layer (via layers stacked); such that the Al is inherently coupled to the copper (via layers stacked); wherein the second trench has a Ti/TiN barrier layer (Col. 2, Lines 46-48) and a copper layer that covers the barrier layer and therefore is over said barrier; wherein one of a plurality of metal layers forms highly reliable bond to gold wire (Col. 3, Lines 28-30).

4. With respect to the product by process claim "the number of metal layers is determined by the width, or "the number of metal layers... is a function of the width and critical width," the prior art structure is the same as the claimed invention. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

5. In regards to the limitations that recite "capable of" for example "stack layers capable of defining a critical width," "layers is capable of being increased as the width increases," or "layers capable of forming...eutectic bond..." Huang's structure is capable of performing the task. ^{THIS WOULD BE LIMITING} Furthermore, it has been held that an element is "capable of" performing a function is not a positive limitation but only requires the ability

to so perform. It does not constitute a limitation in any patentable sense. In re Hutchinson, 69 USPQ 138 (CCPA 1946).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 14, 31-47, 55-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang.

9. Huang discloses elements of paragraph 3 and further that metal layers is bonded to gold wire ("line"; Col. 1, Lines 58-60) and planarized layers (Fig 2D) with a second trench with a width greater than the width, but does not appear to disclose a wire bond

coupling a conductive material to at least one of the plurality of metal layer or that the aluminum layer is an alloy.

10. Examiner takes official notice that wire bonds are well known in the art at the time the invention was made and that it would have been obvious to one of ordinary skill in the art to couple a conductive material to at least one of the plurality of metal layer of Huang, which forms a pad by wire bond in order to communicate with an external device. Further examiner takes official notice that Ti/Tin and Ta/Tan materials are well known barrier layers in the art and that it would have been obvious to one of ordinary skill in the art to incorporate an additional barrier between the copper and aluminum materials of Huang in order to prevent copper diffusion thereby increasing bond strength for bond attachment.

11. With respect to claims 14 and 38, ~~an aluminum alloy comprising Al-Si-Cu or Al-Cu~~ ^{by the prior art} ~~it~~ ^{as Huang} would have been obvious to one of ordinary skill in the art at the time the invention was made to form a first and second metal layer of copper an aluminum, since it has been held to be within the general skill of a worker in the art to select known material on the basis of its suitability for the intended use as a matter of design choice. In re Leshin, 125 USPQ 416 (1960).

12. Claims 9, 10, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in combination with Yost et al. (US 5,444,018).

13. Huang discloses the elements stated in paragraph 3, but does not explicitly disclose that one of the number of metal stack layers couples a first logic device to a second logic device or in the alternative a first and second memory cell.

14. Yost utilizes either a first and second logic or memory cell coupled by an interconnect (Column 2, Line 20; Column 6, Lines 31-36).
15. It would have been obvious to one of ordinary skill in the art to incorporate the contact structure of Huang with the logic interconnect structure of Yost in order to provide a contact structure as required by Yost (Abstract).

Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (703) 305-0244. The examiner can normally be reached on M-F 10:30-8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (703) 308-1233. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


Jmm


DAVID E. GRAYBILL
PRIMARY EXAMINER